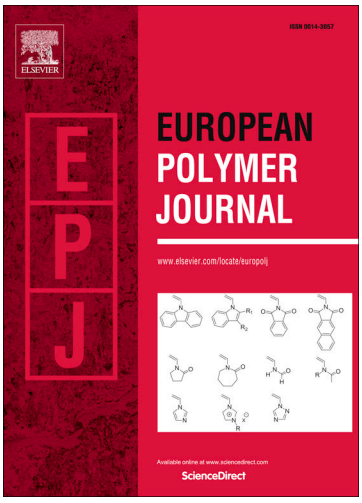

Alcohol Soluble Cyanopyridine based Conjugated Donor-Acceptor Polymers: Synthesis, Photophysical and their Charge Transport Behavior

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Abstract

Two polymers (**PCT1** and **PCT2)** bearing cyanopyridinyl (as acceptor) and phenylene or fluorenyl (as donor) tethered with *N,N*-dimethylaminopropyl group (as side chain) were synthesized via Heck polymerisation technique. Both the polymers exhibit an excellent solubility in methanol and insolubility in solvents like toluene and dichlorobenzene. This specific solubility of polymers helps to avoid the intermixing of successive layers during solution processing of solar cells. Further, gel permeation chromatography (GPC), thermogravimetric analysis (TGA) and photophysical studies confirm that these polymers are having high molecular weight, high thermal stability, low optical band gap and blue light emissive nature. In addition, optical transmittance spectra of polymer thin films coated on ITO substrate disclose the transparency of 90 %, which is better compared to that of poly(3,4-ethylenedioxythiophene) film (80 % transparency). Furthermore, hole only mobility of polymers were investigated by c-AFM method and a mobility of 1.1 X 10^{-6} and 1.3 X 10^{-6} cm^2 V^{-1} S^{-1} were obtained for **PCT1** and **PCT2**, respectively. Here, the obtained mobility values are better compared to other PPV polymers which are reported to be in the order of 10^{-7} cm^2 V^{-1} S^{-1}. More importantly, ultraviolet photoelectron spectroscopy studies reveal that the polymers coated on ITO have a very high work function of 5.45-5.50 eV, thereby minimizes the energy level difference between the electrode andphotoactive organic material (typically 5.7 to 6.3 eV). As a whole, the utilization of these polymers as interfacial layer at the interface of ITO/active layer can reduce the potential energy loss in solar cells.